Amendments to the Claims:

1-18. (Cancelled)

19. (Previously Presented) The method as set forth in claim 23, wherein the step of matching includes:

implementing a K D tree matching algorithm.

20. (Original) The method as set forth in claim 19, wherein the deviation minimizing step includes:

utilizing a Levenberg Marquardt error minimization algorithm.

21. (Currently Amended) The method as set forth in ~~claim 24~~ claim 26, wherein the step of determining the affine transform further includes:

selecting a reduced fraction of points to be matched in the first and second feature image representations.

22. (Currently Amended) [[The]] A method ~~as set forth in claim 21, further including~~ of diagnostic imaging comprising:

storing a first diagnostic image;

storing a second diagnostic image;

automatically registering the first and second diagnostic images without operator assistance, the step of registering including:

converting a portion of the first and second diagnostic images corresponding to a common non-rigid organ into corresponding feature image representations indicative of boundaries of the non-rigid organ in each of the first and second diagnostic images;

determining an affine transform representative of a misalignment of the first and second feature image representations, determining the affine transform including:

matching pairs of points in the first and second feature image representations[[;]], and

removing matched pairs of points that fail to meet preselected criteria;

operating on one of the first and second diagnostic images in accordance with the determined affine transform to register the common non-rigid organ in the first and second diagnostic images;

concurrently displaying a corresponding pair of slices of the first and second registered diagnostic images; and

concurrently stepping the displayed slice pair to display additional corresponding slice pairs of the first and second images.

23. (Currently Amended) A method of diagnostic imaging comprising:

storing a first diagnostic image;

storing a second diagnostic image;

automatically registering the first and second diagnostic images without operator assistance, the registering step including:

determining an affine transform representative of misalignment of the first and second diagnostic images, determining the affine transform including:

reducing a number of points selectively, non-uniformly by one of prior knowledge and randomly ~~with an oversampling of points for optimizing registration along a direction in which the slice pairs are stepped~~,

matching pairs of points in the first and second diagnostic images,

determining differences between locations and surface normals of the matched points, and

minimizing the deviation between the locations of the matched points,

operating on one of the first and second diagnostic images in accordance with the determined affine transform to register the first and second images;

concurrently displaying a corresponding pair of slices of the first and second registered diagnostic images; and

concurrently stepping the displayed slice pair to corresponding regions of the first and second images.

24-25. (Cancelled)

26. (Currently Amended) [[The]] A method ~~as set forth in claim 25 wherein the non-rigid organ is a lung generating the feature images further includes~~ of diagnostic imaging a lung comprising:

storing a first diagnostic image;

storing a second diagnostic image;

automatically registering the first and second diagnostic images without operator assistance, the step of registering including:

converting a portion of the first and second diagnostic images corresponding to a lung into corresponding feature image representations indicative of boundaries of the lung in each of the first and second diagnostic images including:

segmenting the lung in the diagnostic images to assign tissue on one side of a boundary of the lung a first value and tissue or air on another side of the boundary of the lung a second value, distinct from the first value[[;]], and

extracting a boundary layer of voxels of the organ of interest;

determining an affine transform representative of a misalignment of the first and second feature image representations; and

operating one one of the first and second diagnostic images in accordance with the determined affine transform to register the lung in the first and second diagnostic images;

concurrently displaying a corresponding pair of slices of the first and second registered diagnostic images; and

concurrently stepping the displayed slice pair to display additional corresponding slice pairs of the first and second images.

27. (Original) The method as set forth in claim 26, further including prior to determining the affine transform:

scaling the boundary layer; and

normalizing the boundary layer.

28. (Currently Amended) The method as set forth in claim 26, further including:

operating on one of the boundary ~~layers~~ layer with the determined affine transform; and

iteratively determining correction transforms to the affine transform to optimize the affine transform.

29. (Original) The method as set forth in claim 26, further including:

combining an operator selected plurality of slices in each of the displayed slice images.

30. (Previously Presented) The method as set forth in claim 23, wherein the first diagnostic image is a current diagnostic image and the second diagnostic image is a previously generated diagnostic image stored in an archive, further including:

generating the current diagnostic image of a volume of interest of a patient; and

retrieving the previously generated image of the volume of interest of the patient.

31. (Previously Presented) The method as set forth in claim 23, wherein the step of reducing the number of points such that only 1% of the points remain.

32. (Previously Presented) The method as set forth in claim 23, wherein the first and second diagnostic images are aligned along an axis along which the displayed slices are stepped and wherein in the step of reducing the number of points, more data points are retained along the stepping axis than points along other axes such that registration along the stepping axis is enhanced relative to the other axes.

33. (Previously Presented) The method as set forth in claim 23, wherein the step of reducing the number of points removes points adjacent a heart to eliminate motion artifacts caused by the beating heart.

34. (Previously Presented) The method as set forth in claim 23, wherein the step of reducing the number of points includes preferentially removing points which fall near a cut edge.

35. (Previously Presented) The method as set forth in claim 23, further including:

prior to displaying the corresponding pair of slices of the first and second registered diagnostic images, combining a preselected plurality of slices of each of the first and second registered diagnostic images such that during the concurrent stepping step, an operator steps through thick slices of the first and second registered diagnostic images.

36. (Previously Presented) The method as set forth in claim 26, further including:

determining a long axis of the segmented lung in the first and second diagnostic images;

aligning the long axes;

scaling first and second diagnostic images such that a length of the aligned axes is scaled to common units and the long axes have a common center.

37. (Previously Presented) The method as set forth in claim 26, further including removing points along the images of the lungs which are adjacent to a heart to reduce motion artifacts.

38. (Currently Amended) A diagnostic imaging apparatus comprising:

at least one memory which stores a first 3D diagnostic image and a second 3D diagnostic image, the first and second 3D diagnostic images including a common non-rigid organ of a patient;

a display on which a corresponding pair of slices of the first and second diagnostic images are displayed;

a user interface by which a user concurrently steps through a plurality of corresponding pairs of slices of the first and second diagnostic images; and

a registration processor which registers the common non-rigid organ in the first and second diagnostic images, the registration processor being programmed to perform the steps of:

determining a border of the common non-rigid organ in the first and second diagnostic images;

determining corresponding axes of the borders of the common non-rigid organ of the first and second diagnostic images;

aligning the axes and scaling the axes to a common dimension;

selecting a fraction of pairs of points on the borders of the common organ of the first and second images~~, the points being selected with an oversampling of points for optimizing registration along the common axis relative to other axes~~;

matching the pairs of points to determine their relative closeness and a similarity of their normals;

eliminating points that are displaced by more than a selected distance and whose normals fail to match within selected criteria;

minimizing a deviation between the locations of the matched points;

determining a transform which registers the borders of the common non-rigid organs in the first and second 3D diagnostic images by:

applying the determined transform to one of the first and second 3D diagnostic images to align it with the other; and

in response to commands from the user input device, displaying corresponding slices orthogonal to the common axis and stepping to other corresponding slices along the common axis.

39. (Previously Presented) The apparatus as set forth in claim 38, wherein the common non-rigid organ is the lungs of the patient.

40. (Previously Presented) The apparatus as set forth in claim 38, wherein the registration processor is further programmed to:

combine a corresponding plurality of the slices of the first and second 3D diagnostic images such that each displayed pair of corresponding slices represents the sum of a plurality of slices.

41. (Previously Presented) The apparatus as set forth in claim 38, wherein one of the 3D diagnostic images is a current image of the patient generated by a diagnostic imaging device and the other 3D diagnostic image is an image of the patient taken at an earlier time such that the displayed pairs of corresponding slices can be used to determine the progress of at least one of a disease and a treatment for the disease.

42. (New) The method as set forth in claim 23, further including:

oversampling points along a direction in which the displayed slice pair is stepped.